Incorporating "The Illuminating Engineer."

Light and Lighting

Official Journal of the Illuminating Engineering Society.

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Floodlight the Houses of Parliament!

FLOODLIGHTING really came into its own in London in 1931, on the occasion of the holding of the I.C.I. Congress in this country, when it brought into London the biggest crowds that had assembled since Armistice Day. Incidentally the display coincided with this country's departure from the gold standard—serving a useful purpose in helping to distract the public mind during that period of financial stress.

It was again in evidence during the Silver Jubilee (1935) and during the Coronation Festivities in 1937. Since then we have seen little of floodlighting, so far as London's national buildings are concerned. The only apparent motive is economy—that singular form of economy which consists in grudging the use of a handsome present.

At the I.E.S. Annual Dinner the President recalled that members of the Society were responsible for presenting to H.M. Government apparatus for floodlighting its public buildings. Surely his is a reasonable plea—that the Government should follow the good example of the London County Council, and light up (with the apparatus already available) the riverside façade of the Houses of Parliament. Not only would this immensely improve the lifeless appearance of this stretch of the Embankment by night, but by calling attention to the Mother of Parliaments of a democratic country it would make a psychological appeal by no means to be despised at the present moment.

I.E.S. Annual Dinner (London)

The annual dinner of the Illuminating Engineering Society, held in London on March 14 (see p. 74), was, as usual, a very successful and popular event. The attendance (approx. 350) was a record. It seems likely that next year some special measures—possibly the restriction of tables to a uniform "long" type—will be necessary to accommodate still greater numbers. In any case an effort should be made to preserve the system of separate tables, with a place allotted to each member or guest. It has become a tradition for members to make up parties of friends for the event, and the care devoted to the seating arrangements is no doubt largely responsible for the happy and genial atmosphere that always seems to pervade this gathering. The principal guest and the President, in their addresses at the I.E.S. dinner, usually contrive to strike a distinctive note. On this occasion Mr. Berry's references to the Society's association with the L.C.C. led naturally to the question of the needed "hall mark" for illuminating engineers and the plans which the Council is considering for "Fellowship" or some distinctive grade of membership. It is now just thirty years since Mr. Leon Gaster, the founder of the Society, drew attention to the need for the expert "illuminating engineer." Though the Society should, and doubtless will, continue to be primarily a cultural body, open to all interested in the applications of light, the moment seems ripe for some means of identifying those who profess to be experts in this field.

D.S.I.R. Report for 1937-38

The Report of the Department of Scientific and Industrial Research for the past year, recently issued, extends to over 200 pages and shows that its labours have been in no wise diminished. Amongst the various items mentioned under "Illumination Research" are the Study of Daylight Problems, including the illumination of deep rooms; the Study of the Behaviour of the Eye under various conditions; the Standardisation of Lamps and Fittings (colour matching equipment); the Minimum Daylight Illumination acceptable in engineering workshops; the Relative Merits of Light of Different Colours for detecting objects on the roadway; the Reaction between the Illumination Required for the efficient performance of a visual task and the Contrast of Brightness which the details present to the eye. Records of daylight-intensity continue to be obtained at open-air stations in Teddington, Edinburgh, and Manchester.

Another I.E.S. Dinner (Birmingham)

In the preceding week another social function had taken place—the first dinner of the newly formed Midland Centre—which was held in Birmingham on March 10. There was an excellent muster, over 100 being present. The speeches were short and the proceedings informal. The various entertainers were received with enthusiasm (at least two of those who did excellent turns were discovered in the course of the evening!) The President, Mr. Percy Good, who attended from London, proposed the toast of "The Visitors," and, in doing so, told those present something of the plans for the future under discussion in London, and of his experiences in Australia and New Zealand. Mr. C. F. Partridge, Head of the Department of Electrical Engineering at Birmingham Mechanical College, responded. A feature afterwards was the repetition of "Professor Hoodlesnoop's" famous lecture, with its ingenious "darkening" experiments. Mr. G. H. Wilson (there is surely no harm in revealing his, the professor's, real personality) was in fine form, and his triumphal exit, to the chant of "Elma—Eda—Sugg! Sugg!" brought the house down. Mr. Howard Long, who presided, must have been gratified by the success of this first social venture of the Centre. This was due in a large measure to the efforts of the honorary secretary, Mr. A. E. B. Wallis, who not only supervised the arrangements efficiently, but did an entertaining turn based on the discovery that tubular electric lamps, when smartly rapped, can be induced to emit a musical scale.

I.E.S. Meetings

N.B. *Unless otherwise announced all meetings commence at 7 p.m.*

LONDON.*

Apl. 18th. The Application of Air-cooled High Brightness Mercury Vapour Lamps to Projection Problems (V. J. Francis and G. H. Wilson); *Institution of Mech. Engrs., Storey's Gate, S.W.1.*

May 9th. Annual General Meeting. After the transaction of formal business, including the presentation of the **Annual Report of Council** and the **Accounts** of the Society, the **Presidential Address** will be delivered by Mr. Percy Good. *Institution of Mech. Engrs., Storey's Gate, S.W.1.*

BIRMINGHAM.

Apl. 14th. Romance of Illuminating Engineering (F. S. Ette); *White Horse Hotel, Congreve Street.*

**Cancellation of Meeting: It has been decided to cancel the meeting of the Decorative Lighting Section arranged for April 25th. It is hoped, however, to deal with the proposed subject ("The Scientific Aspect of Colour in Relation to Decoration") in the course of next session.*

Cinema Auditorium Lighting

We have been interested to receive further confirmation of the view that it is unnecessary—and, indeed, inexpedient—to show films with a completely dark surround. Dr. M. Luckiesh sends us the following extract from one of his recent addresses bearing on this topic:—

"There was a time when the present primitive lighting and seeing conditions in motion-picture theatres were justifiable. The primary job was to project enough light through the film and on to the screen. The theatre had to be dark. In early years of artificial lighting primitive seeing conditions had to be tolerated elsewhere in home, school, office, and factory. Light was relatively costly, light-sources were relatively feeble, and light-control was not fully developed. However, in the past score of years enormous advances have been made in all these directions. As a consequence extremely primitive lighting and seeing conditions have largely disappeared from interiors, notwithstanding the fact that everywhere there is opportunity for great improvement.

"In motion-picture theatres we can have pictures on the screen bright enough to justify some initial steps in reducing the contrast between the screen and its dark surroundings. Our researches indicate that if the surroundings included in a solid angle of sixty degrees have an average brightness of one-tenth that of the projected picture great improvement in eye-sensitivity, eye-comfort, and seeing comfort would be achieved. In fact, one of our recent researches using as a criterion the rate of blinking (which we have studied in a variety of researches) indicates that the ideal average brightness of the surroundings adjacent to the screen is approximately that of the picture.

"I do not ask that this step be taken all at one time. I would be satisfied with any small step as an indication that motion-picture theatres had joined the parade of progress inspired by the science of seeing. It is too early to worry about the ideal compromise and the ideal gradation of brightness from the edge of the screen outward in all possible directions. Various methods of accomplishing this will occur to those who give it thought. I presented some suggestions in a paper entitled: 'The Motion-Picture Screen as a Lighting Problem,' Journal of the Society of Motion-Picture Engineers, 26, 1936, 578. The scientific foundations upon which my criticisms and suggestions are based are to be found in a recent book by Luckiesh and Moss ('The Science of Seeing.' D. Van Nostrand Company, New York, 1937.) I know that managements of motion-picture theatres and motion-picture engineers want to make progress towards better seeing conditions for the many millions of persons who spend so much time enjoying pictures. With the enormous strain upon eyes and human seeing machines which the critical seeing tasks of modern civilisation impose it would be ideal if our efforts at relaxation in motion-picture theatres were not penalised by unnecessarily primitive lighting and seeing conditions."

Dr. Luckiesh also sends us a copy of a contribution ("The Motion-Picture Screen as a Lighting Problem," by M. Luckiesh and F. K. Moss) in which the problem is discussed in detail and the provision of two fields of graded brightness, one immediately adjacent to the screen and the other a luminous peripheral field consisting of front and side walls. Arguments are apt to centre round the question whether the picture does or does not suffer when moderate general brightness is provided. In this connection one may, however, quote a cogent sentence in the paper mentioned above, "there is no valid reason why the picture should receive *all* the attention and the audience little or none!"

I.E.S. Programme 1939-40

We are now approaching the end of the present session of the Illuminating Engineering Society. Already plans are being developed for the next one. In the course of May, programmes of General and Sectional Meetings in London, and of the various Local Centres, should be substantially completed.

If, therefore, any member has any suggestions for the next session, *now* is the time to produce them.

Offers of papers, long and short (especially those embodying original research), or exhibits of novel and interesting lighting equipment, photometric apparatus, or demonstrations illustrating principles in illumination for the opening meeting will be welcomed.

Modern Lighting in a Canteen

The above picture, showing the appearance by artificial light of the new canteen at the Strowger Works of the Automatic Telephone and Electric Company, Ltd., is interesting as a good example of a method of lighting not always easy to install with complete success. The use of laylights embodied in the ceiling naturally makes a strong appeal in a new installation. It is thus possible to obtain exceptionally well-diffused light and conditions of illumination that can hardly be bettered. At the same time there are certain weaknesses that must be guarded against—notably the avoidance of a "spotty" appearance of the illuminated laylight. Uniform brightness depends upon judicious selection of the glass, the choice of the lighting units above it, and the exercise of care in regard to height and spacing. It is particularly important that the architectural design should not compel the mounting of light units too near to the laylight. The Saaflux R.L.M. reflectors furnished by Benjamin Electric, Ltd., for this installation, which are supplemented by Bencolite fittings at the side, have resulted in an excellent effect, at once soft and cheerful.

What Causes Glass to Break?

This is a question of some moment in the case of unframed glassware, more especially the larger sizes of lighting bowls of diameters from 24 in. to 48 in. A number of contributory causes were mentioned by Mr. George Lovell in a very useful contribution to the I.E.S. Decorative Lighting Section some little time ago. They include unsatisfactory annealing, inadequate thickness, the condition of apertures (the weakest point), the method of support, the effects of local heating, the influence of curvature of the glass and the effect of surface decoration.

Mr. Lovell regarded the method of support as perhaps the most vital question, but thickness (he suggested a minimum of $\frac{1}{4}$ in. for diameters of 30 in. and upwards) is obviously also important. Surface decoration, not only cutting or engraving but (rather surprisingly) sandblasting may weaken and is best not applied near holes. Mr. Lovell suggested that 48 in. might well be considered the maximum safe diameter for the present. Even so some measure of rib-support or the use of a light wire mesh guard is expedient. Perhaps, however, the use of materials other than glass, such as the plastic media, may ultimately result in very much larger one-piece units.

The Illuminating Engineering Society's Annual Dinner

All Records were broken at the dinner of the Illuminating Engineering Society, held at the Trocadero Restaurant (Piccadilly Circus, London, W.1), on March 14th, when there was an attendance of over 350.

The annual dinner of the Illuminating Engineering Society on March 14 was once more an outstanding success, the attendance (over 350) being the greatest ever recorded.

Among the guests of the Society were Mr. J. R. Beard (President of the Association of Supervising Electrical Engineers) and Mrs. Beard, Mr. H. Berry (Chairman of the Town Planning and Building Regulation Committee of the London County Council), Mr. C. Le Maistre (Director of the British Standards Institution), Mr. Howard Robertson (Vice-President of the Royal Institute of British Architects), Mr. E. Shurly (President of the Master Sign Makers' Association) and Mrs. Shurly, Sir Frederick J. West (Vice-President of the Institution of Gas Engineers), and Mr. C. H. Woodward (President of the Association of Public Lighting Engineers) and Mrs. Woodward.

A new and welcome departure was the invitation to chairmen of local centres to attend the dinner as guests of the Society. Unhappily, not all were able to do so, but Mr. F. J. Hawkins (Chairman, North-Western Area Local Centre and Mrs. Hawkins, Mr. Howard Long (Chairman, Midland Local Centre) and Mrs. Long, Mr. J. W. Howell (Hon. Secretary, North Midland Area Local Centre), and Mr. F. X. Algar (Irish Free State Local Centre) were able to do so, and to join in a conference of representatives of local centres—the first of its kind—held in London on the following morning.

As usual past presidents were strongly represented, amongst them being two (Lt.-Col. Kenelm Edgcumbe and Sir John Parsons) who had been present at the historic dinner arranged in 1909 when the decision to form the Society was taken, and Sir Duncan Wilson, the Chief Inspector of Factories and the Chairman of the Departmental Committee, whose recent report on factory lighting had excited so much interest.

The Illuminating Engineering Society.

The usual loyal toast having been duly honoured the toast of "The Illuminating Engineering Society" was proposed by MR. H. BERRY, A.M.I.Mech.E., A.I.Struct.E. (Chairman of Town Planning and Building Regulation Committee of the L.C.C.).

In proposing this toast, Mr. H. BERRY said that he felt that the Society was the inheritor of a long tradition, older even than the race itself. One of the most crucial events in the history of the universe was when its Divine Engineer and Architect uttered the words "Let there be light," for, from the coming of that light, all subsequent developments sprang. He had not the time, nor, he supposed, had his audience the patience, for a description of human efforts, although he could imagine few more fascinating studies. From torch to candle, from candle to lamp, from lamp to modern methods of illumination, these steps were romances in themselves. In his own short lifetime he had seen paraffin lamps displaced by the bat's-wing burner, the latter by incandescent gas; side by side with this he had seen carbon filament lamps displaced by the metallic filament and the arc lamp giving place to the contest between high-pressure gas and gas-filled electric lamps.

He understood that the Society was about thirty years old and that its first president was the great pioneer of electricity, Professor Silvanus P. Thompson. Much had occurred since those days. We understood more to-day concerning the reaction of light on life, and his own authority, the London County Council, was fully alive to this factor with regard to schools and in other directions. He was glad to feel that there had been co-operation between the London County Council and the Illuminating Engineering Society. In connection with his own branch of work at County Hall he had encouraged outside organisations to assist the Council for the common good.

He paid tribute to the work that the British Standards Institute had done, not only with regard to lighting but also in other directions, and expressed his pleasure at the presence of Mr. Good with them that evening.

He trusted that the status of the Illuminating Engineer would be more clearly defined in the near future and that there would be a definite hallmark for him. He invited the company to drink with enthusiasm the toast he proposed, that of a Society which was endeavouring to create and spread that element most useful to human life—Light.

Mr. PERCY GOOD (President of the Illuminating Engineering Society), in response, said that it was delightful and appropriate to have the presence of a representative of the greatest County and Municipal Authority in the world. This was the jubilee year of the London County Council. The Society wished it many happy returns. It was a body of which London had reason to be proud. The Society had special reason to know that in spite of its relatively few years of life it had reached the age of wisdom. The Council had recently thanked the Society for its valuable work and had voted a contribution to its funds of fifty guineas, in order to mark its appreciation of these efforts.

There was something else for which they were grateful to the London County Council—it had had the good sense to recognise the value of floodlighting and the County Hall had started the good work of brightening the riverside. He appealed to H.M. Government to follow this good example. The river front on the north side from Lambeth Bridge to Westminster Bridge looked most forlorn at night, a stretch which included the Mother of Parliaments looked absolutely lifeless. Members of the Illuminating Engineering Society had been responsible for presenting to H.M. Government adequate apparatus for floodlighting its public buildings. The riverside façade of the Houses of Parliament ought to be floodlighted every evening. This would place emphasis on the significance of Parliamentary government and psychologically might affect the recognition of National Service.

Few of the ordinary public, Mr. Good continued, realised the responsibility which lighting officials of municipal bodies often had to carry. There were members of the Society who, as lighting engineers of large cities, carried such responsibilities. He had, however, had the curiosity to consult the Municipal

Photo by "Rawood," Ltd.

This photograph was taken early in the proceedings. The President (Mr. Percy Good) is seated in front of the Toastmaster. Those on his right include: Mrs. Percy Good, Dr. A. P. M. Fleming, Lady Wilson, Sir John H. Parsons, Sir Duncan Wilson and Lieut.-Col. Kenelm Edgcumbe. On his left are seen Mr. Howard Robertson and Mr. C. C. Paterson. Mr. H. Berry, who proposed the Toast of "The Illuminating Engineering Society" arrived after the taking of the photograph.

Year Book and had found there a list of 385 names of officers responsible for lighting within their areas. Of this number only eleven were members of the Society. He hoped that the knowledge of the recognition of the Society by the L.C.C. might provide just that incentive to bring the remaining 374 into its ranks!

Mr. Good remarked that the number of people present at the dinner was a record. The Society was celebrating its thirtieth, and its membership was now nearing the 1,000 mark. There were present at least three members who took part in the dinner in 1909, when it was decided to form the Society: Col. Edgcumbe and Sir John Parsons, both Past Presidents, and Mr. Dow, the Hon. Secretary. No Society had been better served by one who had devoted his life to illumination and to the interests of the Society. Miss Moreton had likewise been in the service of the Society since its formation, and to her and to Miss Wright the Society owed its warmest thanks.

(At a later stage in his address the President also made an appeal to the Dean of St. Paul's to make more use of the equipment for floodlighting the dome of St. Paul's, which members of the Society had likewise furnished. It was well known from what a number of places in London it was visible. A glimpse of the dome at night by people returning from work, standing out as a bright spot in the sky, would be a source of comfort, hope, and inspiration to many.)

The success of the Society was largely due to the fact that its members were so keenly interested in its work. Originally six meetings were considered adequate. This year over fifty meetings had been arranged. There were now five Special Sections and five Local Centres—including the recently formed Midland Centre, where a rapid growth in membership was anticipated. The Society was this year entertaining as guests the chairmen of the Local Centres, who would take part, on the following morning, in a conference on matters of common interest.

A question of great moment was the provision of some form of status for the trained illuminating engineer. Already arrangements had been made with the City and Guilds Institute to provide examinations. The Council hoped before very long to bring before members proposals for a class of membership which would be restricted to those who were fully qualified as illuminating engineers and had a reasonable experience in that work. This would not change the status of other classes of membership; it would only afford an additional designation to those who qualified. This question of status membership, the President explained, was one that had been receiving attention from the two Illuminating Engineering Societies in Melbourne and Sydney, with which he had made contact during his recent visit to Australia and New Zealand. He had urged that an effort should be made to agree upon the title of that class of membership and approximately in the qualifications necessary. We also had the pleasure of meeting the President of the Illuminating Engineering Society in the United States, which was exploring the same problem. He hoped that the conclusion of these discussions would be that a "Fellow" (or whatever designation was applied) of the Illuminating Engineering Societies in all the English-speaking countries would have a reasonably equivalent meaning.

He urged senior members of the Society to encourage juniors on their staffs to study illumination seriously and to take the examinations, and also to become junior members of the Society—thus getting the opportunity of meeting one another and the senior members, as well as enjoying the advantages that the Society offered.

The Society did not confine its attention solely to matters within this country. It was actively participating in international work and would be represented at the meetings to take place in Holland next June.

"The Guests"

MR. F. C. SMITH (senior Vice-President of the Illuminating Engineering Society) recalled a time—scarcely conceivable now—when the Society had not included the ladies amongst their guests. But it was now quite a number of years since they had granted the pleasure of their attendance.

Mr. Smith reviewed briefly the variety of kindred institutions represented. Some, like the Institutions of Gas and Electrical Engineers, the Association of Public Lighting Engineers, the Master Sign Makers' Association, and the Association of Supervising Electrical Engineers, shared with the Illuminating Engineering Society the task of placing artificial light at the service of the community. In several cases

they had to thank such bodies for also sharing in the organisation of sectional meetings.

Mr. Smith endorsed the President's welcome to the representatives of the Local Centres, who had been able to accept the Council's invitation to come up to London. This annual reunion, once successfully launched, should become a most useful annual event in the future.

Reference was made to such bodies as the National Physical Laboratory and the British Standards Association, to whose services illuminating engineering owed so much, and to Sir Duncan Wilson, whose presence, though he was "one of us," they regarded as an honour, and to Mr. Berry, who personified not only a great local authority, but what was perhaps one of the most important groups of all, the consumer.

With so many honoured guests it was always a problem whose name to associate with the toast he was proposing. It would appear that the duty of replying passed round in rotation. On the present occasion the toast was associated with the name of Mr. Howard Robertson, whom they welcomed on his return from the United States, where he had been advising on the lighting of the World Fair.

MR. HOWARD ROBERTSON (Vice-President of the Royal Institute of British Architects) briefly replied in a witty and graceful speech. He complimented the Society on its good work, of which he was well aware, and advised them to bring about greater uniformity in certain fields of lighting—for example, in the streets, where the transitions from blue to orange light were apt to prove disquieting to the motorist. In regard to decorative aspects of lighting, be believed that this country could at least hold its own.

Some Uses of Glass in Illumination

The meeting of the Illuminating Engineering Society on March 7, when contributions on the above subject were presented by Mr. R. F. Taylor and Mr. K. Cheesman, broke somewhat new ground in bringing to the Society a new field, the relation of which to illuminating engineering has scarcely been explored as yet.

Mr. R. F. Taylor summarised the ranges of glasses in common use and showed, with the aid of lantern slides, their characteristic properties in regard to diffusion. He also described some recent innovation, such as the recently introduced "glass brick," with a partial vacuum inside, which seems likely to have a notable influence on architecture. Although it is usually assumed that these bricks are designed primarily for industrial buildings, they have also decorative possibilities. Mr. Cheesman showed some effective illustrations of their use with artificial lighting in shops, cocktail bars, etc.

The discussion turned largely on the properties of these bricks and their possible effect on the access of daylight and "daylight factor." It was suggested that their utility would be enhanced if the internal surfaces could be ribbed or frosted. In regard to cost, one gathered that in better class buildings quite a good show could be made as compared with ordinary bricks, bearing in mind their good heat and sound insulation. Such bricks are not intended to carry great weights, though their capacities may be improved by toughening. At present they are usually incorporated in ordinary architectural designs, though some small buildings abroad have been constructed of them exclusively.

In the course of the discussion the need for a fully descriptive catalogue of decorative glasses was emphasised (ornamental glasses are apt to be diversely described and are not always available on demand), and the fascinating problem of producing "one way glass," transmitting light from outside but not permitting the converse process, was raised.

New Public Lighting in Dublin

In our January issue (p. 16) we gave an account of the new public lighting in Dublin. On March 17 members of the I.E.S. Public Lighting Section had an opportunity of hearing fuller details of these installations from Mr. F. X. Algar.

The conditions found in the centre of the city are typified in O'Connell-street, which varies in width from 100 ft. to 120 ft., and yet is lighted entirely by 1,500-watt units of special design, mounted on the kerb, leaving the roadway itself completely free. This condition was considered essential in the interests of appearance. A considerable amount of care was expended on the design and construction of the grey-green concrete standards, which are inconspicuous, and from certain directions practically invisible. The design adopted was based on a minimum test point illumination of 1 ft.c. and a diversity factor, preferably not greater than 4 : 1. Actually the results are even better than this. There is 1.5 ft.c. at the test point on the road centre, and the variation down the road centre is from 1.2 ft.c. to 1.5 ft.c. The diversity of illumination between the point underneath the standard and the centre point at mid-span is less than 2 to 1, certainly, as Mr. Algar remarked, very unusual figures!

On the Dublin-Dalkey thoroughfare, 7¾ miles in length, the dominant consideration was "long distance visibility" and absence of glare, even at the sacrifice in uniformity of brightness. Avoidance of glare is ensured by the adoption of units having a complete cut off beyond 75 deg. High and even road brightness is, in fact, impossible to secure by reason of the extraordinary variations in the nature of the surface, almost every known variety of road material being represented along the route! Nevertheless a very high degree of visibilty is attained.

The particulars of the illumination on the completed route showed a mid-span road centre illumination of 0.4 ft.c., with 0.2 at kerb line. On the road centre between opposite lanterns the illumination was 1.1 ft.c., and under the lanterns 1.3 ft.c. The overall diversity on the roadway is 6.5 to 1, and from under lantern to mid-span road centre 3.25 to 1.

The conditions of illumination, therefore, show a very fair degree of uniformity. The diversity in brightness is, however, much greater and becomes very noticeable in wet weather, alternate bands of high and low brightness crossing the roadway being seen. The shape and dimensions of the bands do not, however, change noticeably except in the immediate vicinity of the observer when he moves about the road. It is, apparently, this feature, besides the absence of glare, that accounts for the high visibility obtained. Mr. Algar stated that even small objects such as cats and dogs can be easily seen at distances of over a quarter of a mile in dry weather.

Lighting in Factories

Minimum Standards

A very useful two-page leaflet (Form 282) has been issued by the Factory Dept. of the Home Office, giving the essence of the Minimum Standards prescribed in the recently issued Fourth Report of the Departmental Committee. This concise summary should be most helpful to many who have not the time nor the opportunity to study the report. The minimum values of illumination (1.0 ft.c. on working areas, 0.5 ft.c. over other interior parts of a factory, and 0.1 ft.c. over open yards, passages, etc.) are quoted, and the formation requirements in regard to avoidance of glare, the formation of troublesome shadows and flicker are set out. It is emphasised that these standards represent *the least* which the Committee consider satisfactorily acceptable and that they relate to *general lighting* only. Legal minima for the illumination necessary for specific processes are not at present proposed, but the "Recommended Values of Illumination," issued by the Illuminating Engineering Society are quoted as an example of recommended practice.

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Street Lantern Design

Summary of a Paper read by Mr. J. Bertram and Mr. R. Maxted before the Public Lighting Section of the Illuminating Engineering Society on January 27th.

A practical paper on this topic was read by Mr. J. Bertram and Mr. R. Maxted at the meeting of the I.E.S. Public Lighting Section on January 27.

In introducing the subject the authors pointed to the existing divergent points of view—which were reflected in a great variety of designs—ranging from the simple refractor bowl or dome to composite designs in which the alluring form of the circular lantern is forsaken. The solution of the problem really lies in satisfactory blending of the optical and mechanical designs. Generally speaking, it is necessary to obtain a specified distribution of light and a high lantern efficiency with line sources, and also to meet the special mechanical problems that arise. The introduction of new illuminants, such as columns of luminous vapour in place of filaments, radically influenced methods of satisfying these various conditions.

The Model Distribution Curve.

The most difficult and interesting problems arise with the special type of distribution curve involving concentration of light at angles not very much below the horizontal. In the specimen curve of this type shown by the authors the maximum is located between 75° and 80°. Upwards the curve falls back sharply from the maximum, practically all light being confined below 86°, whilst below 75° the limiting edge of the curve becomes a sharp horizontal line. This form of distribution is considered to afford an optimum compromise between the production of high road surface brightness and the production of glare, with staggered spacings of 150 ft.

The Effect of Line Sources.

With compact filament sources a distribution of this nature is obtainable from lanterns of the familiar refractor bowl type. The electric discharge lamps, however, which constitute line sources introduce new complexities. The authors illustrated the form of polar curve of light distribution usually obtained from a vertical line source. The difficulty is to reduce the intensity at and just below the horizontal, whilst retaining high intensities up to 86°. If the line source is operated horizontally, so that the optical design may be based on what is practically a point source, very accurate control of the relative intensities in the vertical plane is possible.

All the light output of the source should be brought under control. Light that cannot be projected in a desired direction cannot be classed as effectively controlled. In the simple refractor lantern the light distribution at angles above about 40° is entirely under the control of the refractor panels. Satisfactory control of the vertical polar curve is possible. Nevertheless about 50 per cent. of the light emitted upwards cannot be collected, and no arrangement of reflectors will bring it back to the refractor panels. The authors discussed various methods of improvement, which, however, involve difficulties and drawbacks

The Composite Lantern.

In the simple reflector lantern the upward light can be properly utilised, but there is a wastage of light for about 30° above the horizontal on either side. The authors described how improvement could be secured by careful location of a strip refractor, which results in a form of composite lantern in which both reflection and refraction are utilised.

Mechanical Problems.

In the next section of the paper the authors discussed the various mechanical problems involved in the design of a lantern combining the desired optical characteristics with robustness and ease of maintenance. Importance is attached to methods which avoid disturbance of the relative positions of parts during cleaning. A type of lantern was illustrated in which the inner refractor members form a rigid assembly which swings clear, and the lamp itself falls into an intermediate position by virtue of a hinged lampholder support. Such defects as faulty focussing, striation, etc., must be avoided. One safeguard is to ensure that each portion of the road is served, not by a single element of the optical system only, but by several parts of it. Automatic focussing is of great importance. Apart from its value optically, it eliminates unskilled handling and speeds up maintenance work. Other matters requiring attention are the provision of easy water sheds (water should not drip on to terminals nor find access into the lantern itself), easy erection caps, and easy wiring arrangements; also vibration proof construction, limitations of lamp and lead temperatures, and the selection of durable materials.

The question of vibration-proof construction was brought into prominence some years ago by the coming of the trolley bus. Lanterns mounted on the poles of such a system must be checked for resistance to abnormal stresses. Vibration also affects lampholder design, e.g., there is a danger that lamps may become unscrewed and replaced unnecessarily.

Materials.

In regard to materials, the choice of aluminium for parts is due not only to its lightness, but also its high resistance to corrosion. Silvered glass reflectors have a high reflectivity, and are easy to clean, and there is now anodised aluminium to consider. Atmospheric corrosion and electrolytic action must be guarded against.

In conclusion the authors suggested that, once the reluctance to depart from familiar lantern forms is overcome, line sources are to be preferred in many respects.

Discussion.

The paper gave rise to a lively discussion in which Mr. J. G. Christopher, Mr. D. G. Sandeman, Mr. F. C. Smith, Mr. J. M. Waldram, Mr. J. S. Dow, Mr. A. Cunnington, Mr. J. S. Smyth, Mr. A. G. Brown, Mr. F. K. Garry, and Mr. E. Russ took part.

Amongst the many topics discussed were the comparative merits of vertical and horizontal lanterns—some still hold that the former has the wider field of application—the desirability of "cut-off" designs, and the importance of background. There were those who contended that the advantages of securing even road brightness by means of curves giving high candlepowers slightly below the horizontal were more than offset by the resulting glare. It was also argued that if—as was now contended—road brightness was mainly due to images of light sources formed in the highly polished road surface, what was needed was a larger number of units of moderate brightness rather than the use of a few units of great beam-power. (In this connection the use of illuminated lamp posts in order to improve background brightness and providing larger patches of reflected light was tentatively suggested!) A useful contribution was that of Mr. F. C. Smith, who pointed out the fundamental difference in methods of maintenance in the gas and electric industries, and explained why permanent focussing was not preferred by the former. In connection with vibration problems, it was mentioned by Mr. J. S. Smyth that lanterns mounted on trolley bus poles had been known to rise and fall a matter of six inches!

Mr. E. Stroud, who presided, recalled that many of the early meetings of the Society had taken place in the house of the Royal Society of Arts, where this gathering was held.

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Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from page 61, March, 1939.)

I.—RADIATION AND GENERAL PHYSICS.

96. A Time Analysis of Sunshine.

F. Benford and J. E. Brock. Am. Illum. Eng. Soc. Trans., 2, pp. 200-217, February, 1939.

Formulae are given for the calculation of the time of incidence of sunlight on surfaces having various orientations. A graphical solution is presented for vertical surfaces, providing a direct solution of the problem for normal windows. One building is discussed in detail. J. S. S.

97. Spectral Reflectivity of Rhodium.

W. W. Coblentz and R. Stair. Frank. Inst., J., 227, p. 265, February, 1939; Bur. Stds., J., Res., 22, p. 93, January, 1939.

The reflectivity of rhodium decreases with the wavelength of the radiation. Although over 90 per cent. in the long infra-red spectrum, it is only of the order of 75 per cent. in the visible range, and falls to about 50 per cent. in the short ultra-violet. It is thus a better reflector than aluminium or chromium for visible radiation, but worse for ultra-violet. S. S. B.

II.—SOURCES OF LIGHT.

98. More Electric Discharge Lamps.

"*Pharos.*" Elect., 122, p. 231, February 24, 1939.

A discussion is given on the advantages resulting from the use of the new 80-watt and 125-watt fluorescent lamps. The author raises the point whether new developments in lamps come at too great a rate for the consumer. C. A. M.

III.—LIGHTING EQUIPMENT.

99. Balanced Light.

Anon. Elect., 122, p. 319, March 10, 1939.

Some details are given of a new method of colour correction of mercury lighting for shop window and other purposes. In some cases special light filters are employed. C. A. M.

100. Kodachrome and Gasparcolor.

"*L. E. C. H.*" Elect., 122, pp. 253-254, February 24, 1939.

As examples of subtractive processes of colour reproduction in photographic transparencies, the Kodachrome and Gasparcolor processes are described. C. A. M.

101. The Technicolor Process.

"*L. E. C. H.*" Elect., 122, pp. 282-283, March 3, 1939.

The Technicolor process of colour reproduction is discussed, together with the light sources with which it is used in cinema studios. C. A. M.

102. The Dufay Process.

"*L. E. C. H.*" Elect., 122, pp. 207-208, February 17, 1939.

As an example of colour reproduction by the additive process in photographic transparencies the Dufay process is described. C. A. M.

IV.—APPLICATIONS OF LIGHT.

103. More Light.

J. W. T. Walsh. El. Rev., Vol. CXXIV., No. 3,197, p. 311, March 3, 1939.

The evidence in favour of high values of illumination is threefold: (a) when unhampered by financial restrictions, the eye selects a high illumination comparable with that prevailing out of doors; (b) the eye can improve its performance with increase of illumination when called upon to work at the limit of its capability; and (c) the effect of illumination on standard of performance is to favour high values of illumination where any discrimination of detail is involved. High illuminations must be accompanied by careful installation design to eliminate glare. R. G. H.

104. Light and Architecture.

Anon. Am. Illum. Eng. Soc. Trans., 2, pp. 143-152, February, 1939.

Some representative architectural lighting schemes are described, with photographs. J. S. S.

105. Better Lighting for Better Selling.

Anon. Beama, 44, pp. 54-55, February, 1939.

Details are given of demonstrations of shop window lighting possible with the various types of light sources now available. C. A. M.

106. Factory Lighting Change-over.

F. L. Cator, A.M.I.E.E. El. Times, 95, pp. 324-327, March 2, 1939.

Problems encountered in the installation of discharge lamps are discussed. Discharge lamp characteristics, lighting load, reflectors, chokes and condensers, wiring arrangements, and pilot lights are dealt with by description and illustration. W. R. S.

107. Demonstrating Stage Lighting.

Anon. El. Times, No. 95, p. 328, March 2, 1939.

Describes a new demonstration stage lighting theatre in which varied effects can be obtained from a light console. W. R. S.

108. Posters and Electric Discharge Lighting.

Anon. Elect., 122, p. 205, February 17, 1939.

A summary is given of the report of the Poster Colour Census Committee on colour distortion by street lighting. Fluorescent lamps are recommended where mercury vapour lamps are used, and floodlighting with tungsten lamps when sodium lamps are installed. C. A. M.

109. The Camera Reports.

Anon. El. Times, 95, p. 163, February 2; p. 205, February 9; p. 295, February 23, 1939.

Photographs and short descriptions are given of cinema lighting, A.R.P. lighting, colour change lighting, and industrial lighting installations. W. R. S.

110. Modern Street Lighting.

Anon. El. Times, 95, p. 289-291, February 23, 1939.

A description of the evolution of street-lighting lanterns and of modern tests applied to them. The optical system and mechanical construction are dealt with, as well as thermal, mechanical, and weathering tests. Photographs are given. W. R. S.

111. Public Lighting in Dublin.

F. X. Algar. El. Rev., Vol. CXXIV., No. 3,199, p. 389, March 17, 1939.

Special units were designed for the new street-lighting system in Dublin, because of the unusually great width of the roads. 1,000 and 1,500-watt filament lamps had been employed. Cambric and asbestos-covered wiring had been used inside the lanterns and adjoining bracket arms because of the high temperatures prevailing. R. G. H.

112. Reducing Night Accidents in New Jersey with Highway Lighting.

E. R. Sherbaum. Am. Illum. Eng. Soc. Trans., 2, pp. 188-199, February, 1939.

An interim report is given on the results of a number of experimental highway lighting schemes in the State of New Jersey. J. S. S.

The 1937 Factory Act makes this instrument essential
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The extract with regard to lighting conditions in factories is as follows:
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Reviews of Books

Public Library Lighting. By R. D. Hilton Smith, F.L.A. Vol. II. Artificial Lighting, Part I.; General Principle of Planning. (Alex. J. Philip, Gravesend, 1938. 95 pp., price, 7s.)

In the introduction to this manual the author recalls his original intention of dealing with all aspects of artificial lighting in Vol. II. (Vol. I., previously published, being devoted to natural lighting). He has found it necessary, however, to confine this first section of Vol. II. to General Principles and Planning, and to reserve for Part II. such special problems as the choice of fittings and systems, showcase lighting, flood lighting, electric signs, etc.

The present work contains five chapters, of which III., IV., and V. deal respectively with Planning, Equipment, and Maintenance, "How Much Light?" and Measurement of Illumination. The introductory chapters are devoted mainly to fundamentals, and contain sound advice on such matters as avoidance of glare. In the subsequent section the question of lighting intensities is discussed with judgment, the values in the I.E.S. recommendations being quoted at length. The author also presents in tabular form the various values suggested from time to time, not only by the illuminating Engineering Society, but also by reports in various American States, by the Lighting Service Bureau, and by certain writers on this subject. The discussion on planning emphasises points in design of special moment to the librarian, and draws on his practical experience. Emphasis is placed on such points as the judicious location of switches, accessibility of lighting equipment for maintenance, and the selection of fittings of a type least likely to harbour dust. In the chapter on "Measuring Illumination," quotations are also made from the hints issued by the Illuminating Engineering Society, and elsewhere frequent reference is made to the E.L.M.A. handbooks. At the end of the book there is a useful bibliography, an adequate index, and a list of recent buildings (or old buildings with new lighting installations) selected as being worthy of inspection.

Neon Tube Practice. By W. L. Schallreuter. (Blandford Press, Ltd., London, 1939. Second Edition, pp. 255, price 10s. 6d. net.)

This work, previously reviewed in LIGHT AND LIGHTING, has now appeared in a second edition. The revision has been extensive, and the rapid changes that have occurred in technique since 1933 (when the first edition appeared), have led to enlargement. Much new material has been added relating to such matters as hot cathode tubes, fluorescent materials, tubing failures, and radio interference. There is no doubt that the value of the book has been considerably enhanced by these additions.

Corrigenda

In the Annual Report of the National Illumination Committee, which appeared in our March issue (p. 54), the name of Mr. P. J. Waldram was inadvertently omitted from the list of those who gave oral evidence on behalf of the National Illumination Committee before the Home Office Departmental Committee on Factory Lighting. Further, Mr. Ritchie's name was included in error. He participated in the collection of evidence, but, unfortunately, was unable to give oral evidence before the Departmental Committee.

Our attention has also been drawn to an obvious error in Abstract No. 80 relating to Artificial Lighting (G. V. Downer), in "Lighting Literature," in our last issue (p. 61), "about 5 foot-candles" being substituted for "*above* 5 foot-candles." At the desire of the author we quote the following passage from his article: "Daylight varies over an enormous range of intensities twice daily, and we can see almost equally well at all intensities from several thousands of foot-candles down to about ¼ foot-candle, or even less. With a similarly well diffused, evenly distributed glareless and shadowless system of artificial lighting we should probably find 1 foot-candle enough for nearly all purposes, but to allow an ample margin I usually advocate about 4 to or 5 foot-candles for most purposes and under average conditions. Yet we often see intensities of 10, 15, 20, and even 50 or more foot-candles recommended, although such high intensities are obviously unnecessary and therefore uneconomical . . ."

Recent Patents

(Abstracts of recent Patents on Illumination & Photometry.)

No. 498,092. "Improvements Relating to Incandescent Electric Lamps."

Van Dyck, A. Dated November 18, 1936, *October* 29, 1937. (*Cognate applications. Convention, Belgium.*)

According to this specification a filament of an incandescent lamp comprises a long thin sleeve or tube having its walls formed of a multiplicity of fine refractory wires, woven, plated or braided into a tube. The sleeve or tube is coiled helically.

No. 498,177. "Improvements in or Relating to Ultra Violet Ray Emitters and Their Envelopes."

The General Electric Company, Ltd. (*Communicated by Patent Treuhand Gesellschaft für Elektrische Glühlampen m.b.H.*) *Dated September* 14, 1937.

This specification describes an ultra violet emitting lamp in which the envelope or jacket is of alkaline silicate glass containing between 0.02 per cent. and 0.4 per cent. of nickel oxide. A typical composition is given. The small trace of nickel oxide leaves the glass practically clear but enhances its transmission of ultra violet light.

No. 498,572. "Improvements in and Relating to Electric Arc Lamps."

Korting and Mathiesen A.G. Dated March 4, 1937. (*Convention, Germany.*)

This specification covers an arc lamp for projection in which the positive electrode is continuously rotated and advanced along its axis, and the negative electrode is supported upon and advanced through a guide by a pivoted arm, which is slidable and rotatable about a fixed pivot and is connected to a crank which is slowly rotated. The arrangement is such that the negative electrode is given approximately a rectilinear motion along its axis.

No. 498,722. "Improvements in Reflectors for Illuminating an Elongated Rectangular Field."

Zeiss Ikon A.G. Dated February 25, 1937.

According to this specification a reflector system for a motor car head light or street lamp consists of two main parts of fundamentally different optical forms. One part is behind the light source and illuminates the more remote portions of the field and is preferably paraboloidal. The second part is of open-ended tubular form, is in front of the source of light in the path of the rays from the first main part, but intercepting as little as possible of those rays. The second part illuminates directly the nearer portion of the field.

No. 498,857. "Improvements in and Relating to Light Transmitting Means."

Frei, J. Dated August 6, 1936. (*Convention, U.S.A.*)

This specification describes an artificial candle comprising a cylindrical glass rod disposed axially over a light source and provided with an integral tip formed of crown glass having a certain critical angle. The tip is of generally conical form with a concave lateral surface, such that rays entering the tip from the rod parallel with the axis thereof are totally reflected to produce a reduced image of the tip portion within itself.

No. 499,221. "Improvements in and relating to Light Projectors Utilising an Electric Light Source."

Anciens Etablissements Barbier, Benard and Turenne. Dated August 11, 1936. (*Convention, France.*)

According to this specification a light projector, such as a searchlight, comprises a cylinder carrying the optical system mounted by trunnions on a frame so that it can be oriented at will. A liquid cooled high pressure mercury vapour lamp is located in the cylinder and is connected by pipes to a cooling apparatus enclosed in a separate casing which is stationary in relation to the lamp.

No. 499,230. "Improved Photo-Electric Apparatus for Light Analysis."

Mullard Radio Valve Company, Limited, and Eaglesfield, C.C. Dated October 19, 1937.

This specification describes a photo-electric light analyser comprising a cathode ray tube, a light sensitive cell controlling the deflection in one direction of the cathode ray pencil and means for governing the deflection in the other direction so that it is a function of the wave length of the component of the light transmitted at any instant which is changed from instant to instant by a series of filters mounted in a rotatable disc, for example.

No. 499,274. "Carbon Electrodes for Electric Arc Lamps."

Droll, J. W. Dated June 9, 1938.

In order to avoid the wastage of short lengths of arc lamp electrodes, according to this specification, such electrodes have a body of carbon with a metallic conducting coating and are provided with means for telescopic end to end connection. The carbon part at one end has a conical socket to receive a spigot at the other end and clips are provided to connect the metallic coatings.

No. 499,745. "Improvements in Electric Imitation Candle Lamps."

Bartlett, S. C. L. Dated June 22, 1937; *September* 14, 1937. (*Cognate Applications.*)

This specification describes an imitation candle flame comprising a series of vanes radiating from a common axis and having a flame-like elevation which are preferably resiliently or rotatably mounted and illuminated from below. Various combinations of such artificial flames with indirect and semi-indirect illuminating fittings are described.

No. 498,853. "Improvements in or Relating to Light Distributing Devices."

The Amplilux Lighting and Illumination Company, Ltd., and Starkie, D. Dated, July 16, 1937.

According to this specification a light distributing fitting comprises a transparent tube, one end of which is open and has an integral outwardly extending annular rim of approximately triangular cross section in planes containing the axis and such that all light rays passing from the light source within the tube through the inner surface of the rim are reflected totally internally from the outer surface through the end surface.

Floodlighting Playgrounds

Enterprising Action by the L.C.C.

For some little time the need for artificial lighting in children's playgrounds in winter time has been evident. They serve a most valuable purpose in summer. The only result of their not being available on dark, winter evenings is that children do their playing in the streets—often under much less safe conditions.

Steps towards providing for such lighting were taken by the London County Council in July, 1937, when a grant of £856 for the installation and maintenance of floodlighting at the children's gymnasium and dry playground at Eelbrook Common, Fulham, was approved. The floodlighting was inaugurated on October 6, 1937, and continued until April 6, 1938. The gymnasium was available for children's play until 6.30 p.m., and was in daily use, the attendance throughout being very good, with a maximum of about 200. It proved difficult to adopt similar measures for the evening institutes during the period 7 p.m. to 9 p.m., as those on the spot were so fully occupied with evening classes. But when the grounds were made available for casual play by the public there was again a good response. Experience, therefore, was encouraging, and the Council determined to persevere.

The scheme was, therefore, extended to eight additional places (Archbishop's Park, Lambeth, Highbury Fields, Islington, Kensington Park, etc.), at a total estimated cost of £5,314. All the sites are equipped with Benjamin "Duoflux" reflectors, mounted 24 ft. high on Revo "Umberstone" steel columns. Although the surfaces lighted have very low reflecting power, adequate effects have been obtained with an expenditure of approx. 1.25 watts per square yard. An experiment at Archbishop's Park is the use of mercury discharge lamps. The running costs are somewhat lower, but the initial cost of installation higher than with filament lamps.

Since the above was written a report on the floodlighting of playgrounds, in which particulars of both gas and electric lighting are given, has been issued by the National Fitness Council. We will comment on this publication (which is available from H.M. Stationery Office for the modest price of 2d.) very shortly.

E.D.A. Luncheon

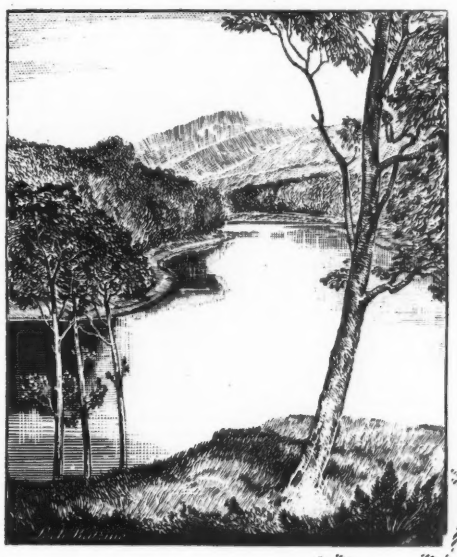
The annual luncheon of the British Electrical Development Association is always an important event. This year's function, held at Grosvenor House, on March 17, attracted a bigger attendance even than usual—doubtless owing to the presence of H.R.H. the Duke of Kent as the principal guest.

In proposing the toast of the Association, His Royal Highness paid tribute to the great value of electricity to the community and to the remarkable progress in its application made during recent years. This country had gone far towards making up any lost headway as compared with other nations. He referred to recent progress in the direction of better lighting in factories, and complimented the Association on the work it had accomplished since its creation twenty years ago.

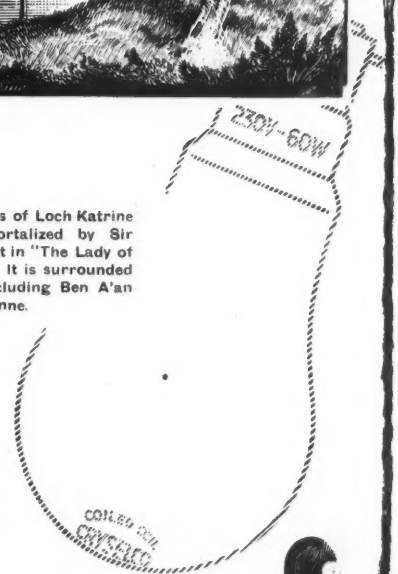
Lord Lytton, who presided and replied to the toast, gave many impressive figures illustrating the growth of the industry, and endorsed the contention that in the domestic field this country was more than holding its own. He paid tribute to the original directors of twenty years ago, and mentioned that two of them, Mr. J. W. Beauchamp, the first director, and Mr. A. C. Cramb, the present one, were at the luncheon.

After the luncheon Brigadier-General R. F. Legge presented to His Royal Highness, on behalf of the Association, a model train, electrically operated, which, it was hoped, would amuse Prince Edward.

Beautiful Waterways



The beauties of Loch Katrine were immortalized by Sir Walter Scott in "The Lady of the Lake." It is surrounded by hills, including Ben A'an and Ben Venne.



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NOTES ON ILLUMINATING ENGINEERING ABROAD

(Specially Contributed—H. L. J.)

Switzerland.

In "Electrical Service" M. Louis Fabre, the Swiss opposite to the Director of the Swiss Electrical Contractors Association, discusses home lighting problems, with particular reference to local conditions. Although current consumption for lighting in homes is at its peak late in the evening only and, for half the year, early in the morning, electricity undertakings are keen to develop the lighting load in this field owing to the comparatively high revenue derived therefrom. To allow for a fairly inexpensive development of lighting loads, dimensions of the wiring installation have to permit a wide margin for additional demand. Certain electricity undertakings, for instance, that at Geneva, prescribe nine initial outlets for a circuit of 120 volts and sixteen for a 220-volt one. Present-day sitting-rooms have ten or even more lamps, whereas those of a few years ago had only five. Such a development is only possible if the design of the installation allows for an additional load without costly alterations. It is unfortunate that, in the case of rented homes, the majority of landlords usually only provide for electrical installation when the budget for building or upkeep is exhausted. As a result expenses of installation are apt to be cut down to an absolute minimum, and adequate wiring becomes impossible. A further difficulty to the building up of lighting load is the growing practice whereby the landlord provides fittings for passages, bathrooms, kitchens, etc. The substitution for such fittings of others preferred by the tenant generally meets with the objection of the landlord on the grounds that the wiring installation is not adequate or that preferential treatment of one tenant might incur further expenses for others in the same building. In framing recommendations for the lighting of different rooms, the author suggests that in the hall at least sufficient light to read a visiting card comfortably is required! In the dining-room provision should be made for subdued and "intimate" lighting for normal occasions and brighter when the family is alone, but, at the same time, for ample lighting when guests are entertained. The lay-out of lighting for the sitting-room should be governed by an endeavour to enhance the beauty of woman, which, in effect, means a soft, indirect lighting, with occasional direct light sources in addition. In the case of bedrooms he appeals to fittings makers to improve the construction of reading lamps and mirror fittings, and to promote increased comfort by such devices as provision of light in cupboards. As regards the running cost of lighting installation in homes, it is clearly pointed out that whatever the cost of electricity may be the budget for lighting is always very small. The observation is made that, in many cases for false economic reasons, a saving on lighting is effected by methods which actually prejudice comfort. It is regarded as inexpedient, for instance, to be continually switching on and off the lights in the hall, which members of the family cross constantly, with the resultant inconvenience and waste of time in finding the switch.

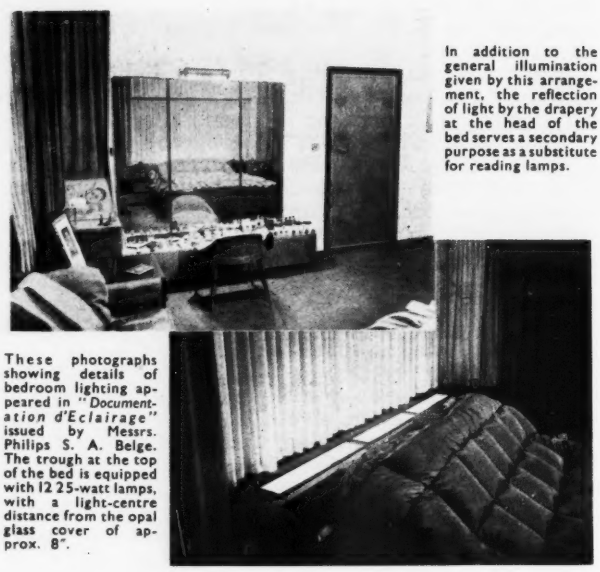
U.S.A.

"A Discussion on Highway Lighting," summarises a discussion on a paper by W. P. Bear, entitled "Bridge and Highway Lighting in California." Among others, the following points are raised: Although the value of statistics might be doubted to some extent, it has been proved that increase of illumination of the highway lessens the number of accidents. The illuminating engineer should not be content merely to reduce the number of night accidents to the level of day accidents, but should reduce them even further and, at the same time, give a lead to the solution of certain day accident problems.

The National Research Council at Washington recently called together a conference of nearly fifty people, consisting of State, highway and motor-vehicle commissioners, representatives from the United States Department of Roads, Inter-State Commerce Commission, Bureau of Standards, utilities, manufacturers, engineers, and, officially, a representative from the Illuminating Engineering Society. Thus, for the first time, national recognition was given to street lighting as a national problem. A committee has been appointed to prepare recommendations for the prevention of accidents on roads.

Present statistics assume as "day accidents" those which occur between 6 a.m. and 6 p.m. It is recommended that a more accurate picture be presented by classifying the accidents according to the actual conditions of natural lighting prevailing. In discussions of erection costs the fact should not be overlooked that certain special items of expenditure have to be incurred to provide for satisfactory daylight visibility, and are not entirely associated with the artificial lighting.

Belgium.



In addition to the general illumination given by this arrangement, the reflection of light by the drapery at the head of the bed serves a secondary purpose as a substitute for reading lamps.

These photographs showing details of bedroom lighting appeared in "*Documentation d'Eclairage*" issued by Messrs. Philips S. A. Belge. The trough at the top of the bed is equipped with 12 25-watt lamps, with a light-centre distance from the opal glass cover of approx. 8".

France.

In "Lux," P. Bossu recently discussed the measure adopted by the French authorities of introducing compulsory yellow colour for use in car headlamps. He quotes a series of authors whose investigations are said to have proved favourable to yellow light, e.g., Polak and Commandan, who contend that in cinema studios it would diminish fatigue; Faillie, Jonnard, and Vial, who find that the pupil-aperture of the eye is relatively larger in yellow light as compared with white light; Mounton, who has found that the period of adaptation necessary for recovery after exposure to intense brightness is less. In misty atmospheres yellow light has at least the same penetrative power as white light. (It is suggested that the experiences in this connection of Stiles may be disregarded—because the nature of fogs in the British Isles is quite different from those in France!) Finally, quotations from "L'Industrie des Voies Ferrees et des Transports Automobiles" are made to the effect that the pyscho-motric reaction time in yellow light is less than in white light.

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Street Lighting Improvements

The first gas street lighting scheme in this country for trunk road lighting to qualify for the Ministry of Transport grant under the Trunk Roads Act, 1936, has now been finally approved by the Ministry, and will be carried out on 1¼ miles of the Newport-Shrewsbury road. This part of this important traffic route lies in the area of the Abergavenny Corporation, and the Corporation Gas Department is in charge of the lighting.

The new installation, which is for a term of ten years, comprises fifty-four gas lamps of the latest pattern, each of which has ten mantles. They will be mounted on 25-foot steel columns, with a 6-foot overhang on to the roadway, and will be spaced at intervals of 120 ft. to 150 ft., according to bends, road junctions, etc. Automatic lighting and extinguishing devices are fitted to all lamps.

The contribution of the Ministry of Transport to this improved lighting system is a 50 per cent. grant for capital charges, and a similar grant for annual maintenance and supervision.

The Abergavenny Corporation Gas Department is also carrying out a number of improvements in the town's street lighting, although this is not eligible for a Ministry of Transport grant. In the main shopping street the existing lighting is being replaced by a similar installation to that adopted for the trunk road, and higher powered lamps are being substituted for the lamps in commission on other roads. During a recent month, for example, twenty-two 2- and 2-light lamps were replaced by 4- and 7-light suspension lamps. All lamps in the town are now fitted with automatic control for lighting and extinguishing.

The Newtownards Borough Council has renewed its contract for street lighting by gas.

The Lighting Committee of the Morecambe and Heysham Town Council has agreed on a five-year plan for improvements in the street lighting of the area under the Council's control. The scheme will involve the replacement of old-type lamps by some 528 modern gas lamps; of these forty-nine are 12-light lamps mounted on 25 ft. concrete columns.

A ten-year contract for public lighting by gas in the Borough of Grantham has been approved by the Grantham Corporation. About 623 lamps are covered by the agreement, and over one-third of these are to have their candle-power raised

---

A three-year contract for gas lighting entered into by the Banbury Town Council specifies improvements in the town's lighting. About 470 lamps are at present in use.

Hayes and Harlington U.D.C. has entered into a ten-year agreement for gas lighting in some of the streets in its area. Improvements in the lighting will have the effect of continuing the same standard of illumination as that provided over a continuation of an important thoroughfare which enters the Feltham U.D.C.'s area. In this area a fifteen-year contract for gas lighting is in force.

A five-year contract for gas lighting has been approved by the Brandon (Suffolk) Parish Council. The candle-power of the lamps is to be increased.

Over 3,000 lamps are covered by a renewal of its gas lighting contract by the County Borough of Warrington.

Gas lamps in the area of the Tottenham and District Gas Company continue to increase. The number is now 12,190.

A Picture of the World's Fair, with New York's Buildings in the Background

This first official picture of New York's World Fair, opening on April 30, gives a good idea of its scope. The various arterial and railway connections tying the 1,200 odd acres of the Fair to the mainland are clearly visible. In the background are the famous pinnacles of New York's buildings. The "Perisphere and Trylon," illuminated at night, form a central point adjacent to which are buildings and displays of some 1,400 exhibitors. Below may be seen the Court of Peace and the fountain-studded Lagoon of Nations. South of the main boulevard there is a 280-acre amusement park, fronting on Fountain Lake, where nightly fire and water shows will be given.

We are interested to receive from Pickford's Travel Service particulars of tours extending from July 22 to August 13 which take in the Fair and also include visits to Niagara Falls, Detroit, Chicago, Washington, and other cities. Three possible itineraries are offered, all giving opportunities of interesting visits to engineering works, etc. The longest trip takes in Los Angeles and San Francisco. The three tours cost respectively £54, £70, and £104.

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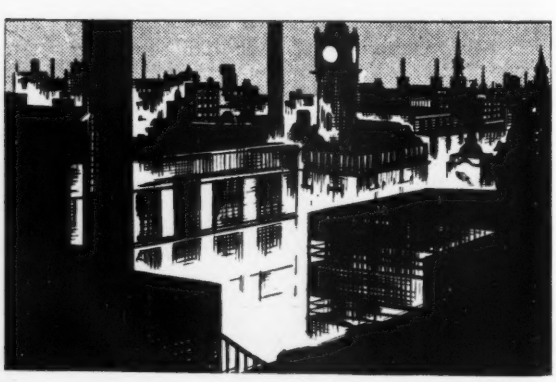
LIGHT IN DAILY LIFE

BY J. STEWART DOW

A Survey of Artificial Light in the Service of Mankind

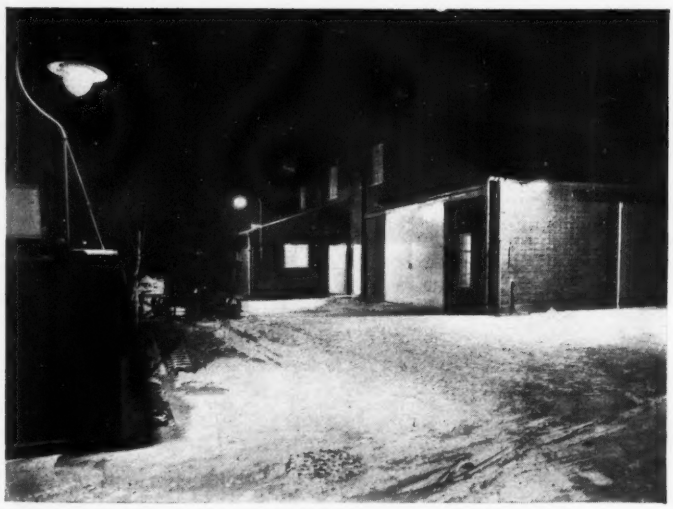


The Floodlighting of Staple Inn, London

Should ancient buildings be maintained and restored, and if so are they fit subjects for floodlighting? This is, perhaps, a matter for argument, but we think that few Londoners would wish to see the disappearance of the famous Staple Inn Buildings in London, dating from 1545-1589. These buildings, fortunately, have been preserved.

The rear elevation was encased in brick in 1826 and the front, after various alterations, was restored to its original design in 1886. Although the entire building has been recently renovated, the old front, with its picturesque oak beams and latticed windows, still remains.

The front building is now floodlighted. The projectors are mounted above the shop windows so as to throw into relief the historic frontage with its striking black and white contrasts. For this purpose seven G.E.C. 500-watt floodlighting units are installed. They are held in position in wrought-iron brackets harmonising with the character of the building. The installation was designed by G.E.C. illuminating engineers in connection with the Engineers' Department of the Prudential Assurance Company, Ltd., and was carried out by F. H. Wheeler and Co., Ltd., of Victoria-street.



Gas Lighting in a London Factory

The illustrations show the gas lighting in the works of Messrs. W. A. Telling, Ltd., plastering specialists, Brixton, which is of a high standard.

On the approach road to the factory (used extensively by lorries for loading and unloading) seven six-mantle lamps are installed. The works are lighted by ten six-mantle lamps, the type of fitting installed conforming to the recommendations contained in the Fourth Report of the Departmental Committee on Lighting in Factories. Gas lighting is also used in the offices, canteen, lavatories, and other parts of the premises.

IF YOU ARE INTERESTED IN LIGHTING (AND WHO IS NOT?) WHY NOT JOIN THE ILLUMINATING ENGINEERING SOCIETY?

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(3) have opportunities of meeting others with similar interests at social events, such as the Annual Dinner.

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FULL PARTICULARS FROM THE HONORARY SECRETARY OF THE ILLUMINATING ENGINEERING SOCIETY, 32, VICTORIA STREET, LONDON, S.W.1.

A view of the Winding department, British Crepe, Ltd.

Electric Discharge Lighting in the Silk Industry

We are indebted for the information given below to Mr. E. Douglas Boult, Chief Engineer to Messrs. G. H. Heath & Co., under whose supervision the lighting was installed.

Part of department of mills of G. H. Heath and Co., Ltd., Middlewich, where silks are made.

The coming into force of the Factories Act (1938), with its specific requirement of adequate lighting, has emphasised the importance of good illumination in the silk industry, where many fine processes are involved. The largest firm of silk throwsters in this country, Messrs. G. H. Heath and Co., of Macclesfield, and their associated company, Messrs. British Crepe, Ltd., have taken a great interest in this subject. The spinning and twisting of real silk threads for the hosiery and silk weaving trades involves the processing of threads as small as 2/1000ths of an inch in diameter. In order to detect faults in such fine material and to handle it properly, constant alertness is needed and sharp and accurate vision is of first importance. After experiments with many forms of lighting, the "Q.H." type electric discharge lamps of Siemens Electric Lamps and Supplies, Ltd., have been adopted. The quality of light yielded has been found peculiarly suitable for picking out detail, the hair-like thread appearing like a silver wire in its passage over the machines. In this particular instance colour-matching, as a process, does not arise. It is rather curious to note, however, that the recognition of the various colours used for identification purposes was found to be easier than when filament lamps were used.

One of the chief problems was the adequate lighting of the machines, which are often six feet high and set very close together. The rooms varied, ceiling heights often differing by as much as from ten to twenty feet. Hence, in order to obtain correct light distribution many experiments had to be undertaken. Other experiments were necessary in order to eliminate the stroboscopic effect of discharge lighting—an important precaution in shops where revolving shafts and spindles are installed.

The final result has been completely successful. An even and pleasing diffused light, with an entire absence of dark shadows, has been secured, and Messrs. Heath are able to report a highly increased efficiency.

The sizes of the Siemens Q.H. lamps installed are 80 watt and 125 watt, according to the size and height of the room. Benjamin fittings are used throughout. Economy in running cost is very noticeable. In one instance a room at the factory was lighted by discharge lamps consuming a total of 4.7. kw. and giving approximately 13 to 15 ft.c., whereas with gasfilled lamps the same room would have required 14.5 kw. to give an average lighting intensity of 7 or 8 ft.c.

Illuminating Engineering Societies at Home and Abroad

Useful tabular information on the Illuminating Engineering Societies in Great Britain, Australia, U.S.A., and Germany is tabulated in a recent issue of the "G.L.I.S." (General Lighting Information Service) bulletin, compiled by Mr. H. L. Juliusburger. The respective membership totals are, in order: 1,000 (nearly); 105 (Victoria) and 147 (N.S.W.); 2,684; and 977. It is interesting to observe that although the U.S.A. membership is more than two and a half times that in this country, the ratio to the population (1 in 48,000) is almost identical in the two cases. In contrast, the actual membership in this country and Germany (including Austria) is almost the same, but the membership in the latter country (1 member per 71,500) forms a smaller fraction of the total population.

The End of "The Gaiety"

New Use for a Famous Site

The interesting announcement has been made that the Gaiety Theatre has been purchased by Crompton Parkinson Ltd., who propose to erect a block of offices on this famous site. £250,000 is mentioned as the probable cost of the new building, which will be thoroughly up to date, with car park, air conditioning, A.R.P. shelter arrangements, etc.

It is unnecessary to remind our readers of the history of Crompton Parkinson Ltd., one of the largest manufacturers of electrical equipment in this country. The existence of the firm dates back to 1878, when Colonel R. E. Crompton began the manufacture of electric lamps in Chelmsford. Whilst many will regret the passing of the Gaiety Theatre, with all its happy old associations, it is consoling to learn that the site is to be put to good use.

Mobile Aerodrome Landing Floodlight

An impressive exhibit at the G.E.C. stall at the British Industries Fair (Birmingham) was the 4 kw. mobile aerodrome landing floodlight here illustrated. This was shown complete with its petrol engine, alternator, exciter, and switchgear, all mounted on a trailer for easy transport. The floodlight consists of two parabolic silvered-glass trough reflectors mounted one above the other. Each accommodates one 2,000 watt Osram horizon type lamp, having its line filament at the line focus of the reflector. Full adjustment of the lamp in relation to the mirror is provided by the focusing and adjusting screws. The floodlight is constructed of sheet copper, and non-ferrous metals have been used throughout except for the two-piece cast-iron rotating base. The half-cylindrical glazed doors, which slide round the back of the floodlight for cleaning or replacing lamps, make the complete floodlight entirely weatherproof. For transport these doors are protected against stones or debris thrown by the wheels by means of detachable aluminium shields. The whole floodlight is surmounted by a two-lamp obstruction light, which is fed from the low-voltage equipment on the trailer.

G.E.C. 4-kW. mobile aerodrome landing floodlight.

The Illuminating Engineering Society (U.S.A.).

Notes on Transactions (February, 1939)

NEWS: Thirteen of the "houses of to-morrow" to be exhibited at the World's Fair at New York will be furnished by the I.E.S. Better Light Better Sight Lamp and Shade Manufacturers' Association. *Three new types of photoflood lamps*, equipped with inside frosted blue daylight type bulbs, have been made available since January 1—rated hours of life at 115 v. are 2, 6, and 10 respectively.

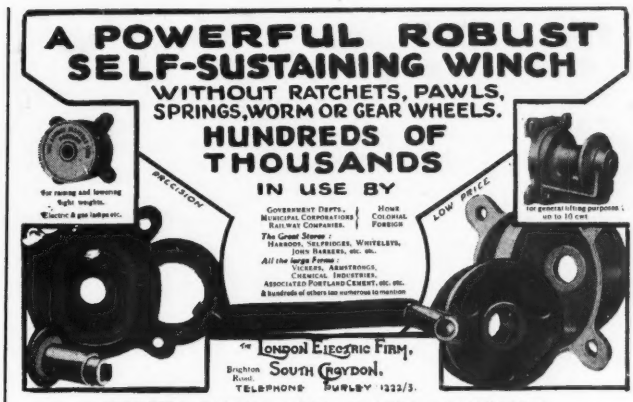
SUBJECTS OF PAPERS: "Researches on Industrial Lighting"—"*The Lighting of Power Presses.*" Investigations on this subject have been made by the Committee on Industrial and School Lighting. The presses were divided into two classes, a small class requiring one operator and a larger type more than one. Analysis of the respective operations led to the following recommendations.

In the case of small presses—general illumination by an overhead system giving at least 10 f.c. on the working plane; supplementary local lights placed behind the press, with an angle type, circular, rectangular, or elliptical reflector giving a relatively wide and smooth distribution; maximum beam candlepower 300-350 at an angle of 70° to be achieved with a 100-watt lamp. Minimum illumination on the actual die should be at least 15 f.c., and in the case of stock handling 10 f.c.

In the case of large presses a general illumination by overhead lighting is again recommended, giving at least 10 f.c. on the floor in front of the machine, local lights, at least one, with a 100-watt concentrated industrial spot light having a polished reflector of clear or lightly stippled coloured glass, main beam 1,500-2,000 candles, spread 30° to 40°, louvre rings to avoid glare for the operators. For forming, bending, or shearing, main illumination from local light 15 f.c., for die repair 25 f.c., and for stock handling 10 f.c. are recommended. An additional portable lamp in certain cases is needed. The economy of the improved lighting system is proved by savings on repairs, worked out in particular cases.

"*Reducing Night Accidents in New Jersey with Highway Lighting*," by E. R. Sherbaum. New Jersey occupies a foremost position as a seashore resort area, and the roads leading to this coast bear very heavy holiday traffic. In addition, it bears a heavy truck traffic (garden produce) to New York and Philadelphia. Whereas the average capacity of highways in the county is calculated between 1,700 and 1,800 motor vehicles per day, there are roads in New Jersey which carry 60,000 per day. The accident figure grew steadily until 1937, when an average of four persons killed and twenty-four injured per day obtained. Effort was, therefore, concentrated on making the roads safer. Accident laboratories were established on sections of the highway system, twenty-four hour accident patrols were inaugurated on five-mile sections, and continuous traffic recording was instituted. Every accident, however small, was recorded, and analyses of reports sent to headquarters for final study. Experimental alterations in the highway lighting system were effected and accident statistics recorded. This resulted in reducing the number of night accidents and enabled the efficiency of various highway lighting systems to be proved. Subsequently, for the first time in the legislative history of New Jersey, a fund of 150,000,000 dollars was instituted to assist highway authorities with insufficient means to erect efficient street lighting installations.

"*A Time Analysis of Sunshine*," by F. Benford and J. E. Bock, is a study of the time and duration of sunshine through the year and particularly the time of incidence upon building walls having various orientations. One possible application of these data, mentioned in the discussion, is to the latest type of greenhouse, having one side of the roof made of glass and the rest of the greenhouse constructed of heat-insulating material. In such circumstances it is important to secure maximum sunshine through the restricted glass portion.



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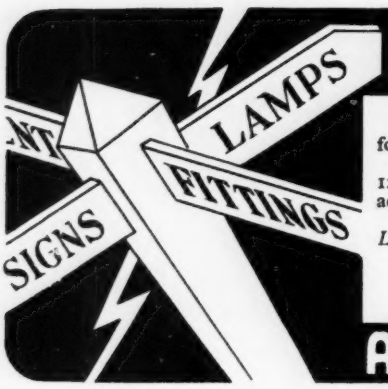

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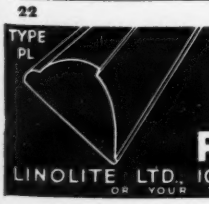

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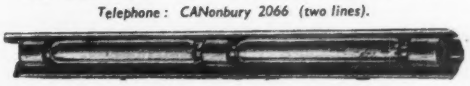
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N.B.—The numbers are those attached to individual entries in the Directory (See pp. 90—92)

Revo Lighting in a Motor Works

The above picture shows the appearance by artificial light of a section of the new works of the Express Motor and Body Works. The lighting, by means of Revo industrial reflectors and gas-filled lamps mounted in a special manner, has given excellent results. One evident good feature of the lighting installation is the mounting of units high up out of the direct range of view so that there is a clear outlook throughout the length of the room.

Rhythmatic Control in Falkirk

A notable event on March 27 was the inauguration, in Falkirk, of "Rhythmatic Control," the most recent development of Automatic Telephone and Electric Company, Ltd. At Falkirk some 400 public lamps are controlled by the system, which, however, also enables numerous other public services to be controlled from a central point. As many as twenty-four different switching operations are possible. The system uses four audio frequencies and six different impulse timings, to which special relays containing tuned circuits respond. Besides its application to tariff change-overs, electric water heating, etc., the system has important A.R.P. applications, as demonstrated at Falkirk during the recent Eastern Scotland "black-out."

Catalogues Received

W. T. HENLEY'S TELEGRAPH WORKS, COMPANY, LTD.—Third edition of catalogue devoted to Overhead House Service Installations. Alternative types of cables and a full range of fittings are presented.

PHILIPS LAMPS, LTD.—"Selling Light" (January-February). Readable articles deal with distribution of light, new discharge lamps, new uses for invisible light, "photoflux" flash bulbs, floor standards, etc.

ROWLANDS ELECTRICAL ACCESSORIES, LTD.—"Realumination." the title of a comprehensive, illustrated catalogue featuring many types of "R.E.A.L." and "Realite" special lighting units. The Realite "Balanced Light" system of colour-corrected mercury lighting is described.

SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD.—List No. Z146, devoted to Siemens House Service Cut-outs and Power Fuze Boxes.